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IS 10592 (1982): industrial emergency showers, eye and face fountains and combination units [CHD 8: Occupational Safety, Health and Chemical Hazards]



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**IS : 10592 - 1982**  
(Reaffirmed 2007)

## *Indian Standard*

# **SPECIFICATION FOR INDUSTRIAL EMERGENCY SHOWERS, EYE AND FACE FOUNTAINS AND COMBINATION UNITS**

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**BUREAU OF INDIAN STANDARDS**  
**MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG**  
**NEW DELHI 110002**

**AMENDMENT NO. 1   OCTOBER 1995**  
**TO**  
**IS 10592 : 1982   SPECIFICATION FOR INDUSTRIAL**  
**EMERGENCY SHOWERS, EYE AND FACE FOUNTAINS**  
**AND COMBINATION UNITS**

( *Page 6, clause 4.1.3, line 4* ) — Substitute '110 l/min' for '250 to 300 l/min'.

( *Page 11, clause 6.1.2, line 2* ) — Substitute '294 kPa' for '2.94 kPa'.

( CHD 008 )

# Indian Standard

## SPECIFICATION FOR INDUSTRIAL EMERGENCY SHOWERS, EYE AND FACE FOUNTAINS AND COMBINATION UNITS

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## *Indian Standard*

# SPECIFICATION FOR INDUSTRIAL EMERGENCY SHOWERS, EYE AND FACE FOUNTAINS AND COMBINATION UNITS

### 0. FOREWORD

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 30 September 1982, after the draft finalized by the Industrial Safety Advisory Committee had been approved by the Executive Committee.

**0.2** The Factories Act, 1948, and the various Rules framed thereunder require that hazardous chemicals should be expeditiously removed from direct contact with body by taking suitable steps. Specially when a corrosive or irritating chemical affects a vital organ like the eyes, the effects may range from mild irritation to severe burn injuries. In such situations, it is essential that the body and eyes are washed with large volumes of clean water for removal of the chemicals as well as for its dilution. Such flooding with large volumes of water also dissipates the heat generated during a chemical reaction which may take place between the chemical and water. It is essential that in all areas where exposure to such corrosive or toxic chemicals is possible, adequate eye and face protection of proper type is used by the concerned persons. Such protection for eyes, face and entire body can be easily provided by emergency eyewash fountains and emergency safety showers, if they are suitably located and properly designed and maintained.

**0.2.1** It should, however, be emphasized that emergency eyewash, shower, and combination units are not a substitute for proper primary protection devices. As a defence against flying solid particles and splashing injurious liquids, workers should wear eye and face protectors and protective clothing.

**0.3** It is a general practice in many industries to install eye and face wash facilities and emergency safety showers as a combined and integrated unit. However, there are also situations and locations where only eye and face washing facilities or only emergency safety showers would be adequate. Since the basic principle in their use is the same, this standard includes provisions in respect of both the devices.



**0.4** It is recommended that the delivered water should not be at a temperature that might be expected to discourage the unit's effective use under emergency conditions. A comfortable range is 15 to 35°C. In circumstances, where chemical reaction is accelerated by water temperature, the physician should be consulted for the optimum temperature for application.

**0.5** Throughout this standard, minimum water capacities have been rated at an inlet supply pressure of 196 kPa ( 2 kgf/cm<sup>2</sup> ). This inlet pressure, while below that what is normally considered a proper criterion for design, 294 kPa ( 3 kgf/cm<sup>2</sup> ) has been chosen because of the installation requirements that may find units located at unusual distances from normal supply lines.

**0.6** In the preparation of this standard liberal assistance has been derived from the following documents:

Selection and use of eyewash fountains and emergency showers, *Chemical Engineering*. 15th Sept. 1975.

United States of America. Occupational Safety and Health Act. (General Industries Standards applying to eyes stroke face wash fountains and emergency showers ).

Use of water in emergency treatment of chemical eye injuries. American Medical Association. Vol. 168, p. 47, Sept. 6, 1958.

ANSI Z 358.1 — 1981 Emergency Eyewash and Shower Equipment. American National Standards Institute.

**0.7** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS: 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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## **1. SCOPE**

**1.1** This standard prescribes minimum performance requirements for emergency showers, eye and face fountains, and combination units.

## **2. TERMINOLOGY**

**2.0** For the purpose of this standard, the following definitions shall apply.

**2.1 Combination Unit** — A unit combining a shower and eyewash, or eye/face wash; and/or drench hose into one common assembly.

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\*Rules for rounding off numerical values ( revised ).

**2.2 Emergency Shower** — A unit that enables users to have water cascading over their entire body.

**2.3 Emergency Shower Head** — A specially designed head for use on an emergency shower.

**2.4 Eye/Face Wash** — A device used to irrigate and flush both the face and the eyes.

**2.5 Eyewash** — A device used to irrigate and flush the eyes.

**2.6 Flow Pressure** — The gauge pressure measured at the pipe wall during flow.

**2.7 Flow Regulator** — A mechanical device to control the flow of water through pipes.

**2.8 Hand Held Drench Hose** — A flexible hose connected to a water supply and used to irrigate and flush eyes, face, and body areas.

**2.9 Multiple-Spray Shower** — An emergency shower using more than one head and delivering water from more than one direction.

**2.10 Plumbed Eyewash** — An eyewash unit permanently connected to a source of potable water, and meeting the performance requirements of this standard.

**2.11 Self-Closing Valve** — A valve which closes automatically when released.

**2.12 Self-Contained Eyewash** — An eyewash that is not permanently installed and must be refilled or replaced after use, and meets the performance requirements of this standard.

**2.13 Stay-Open Valve** — A valve which has to be manually closed.

### **3. LOCATION**

**3.1** Emergency face/eye wash fountain and showers or combination units shall be located in all areas where there is a possibility of chemical splash injury of eyes or face or body, or exposure to irritating chemicals. These facilities shall be located in such a way that they do not pose a problem by reaction with water sensitive chemicals and shall be so arranged that there is no obstruction in going from the work spot to their location.

**3.2** The facilities shall be located at a convenient place. As far as possible, they should be within a distance of 15 m from the place of work.

**3.3** Proper drainage system shall be made for quick disposal of used water.

## **4. EMERGENCY SHOWERS**

### **4.1 Basic Design**

**4.1.1** The emergency safety shower ( *see* Fig. 1 ) should wash the entire body surface with large volumes of water in the shortest possible time. This device essentially differs from an ordinary domestic shower in its capacity and manner of delivering water.

**4.1.2** Emergency showers are generally of two designs, namely, overhead single dome type, and multiple nozzles spray type.

**4.1.3** Because of the deluge action required, water pressure head for the emergency shower shall be not less than 196 kPa ( 2 kgf/cm<sup>2</sup> ) and the total water delivered from the shower or the spray nozzles shall be not less than 250 to 300 l/min. The emergency showers may be actuated by a step-on foot valve which may be of the self-closing type, or hand-operated self-closing or stay-open type which may be operated by a chain or pull rod.

**4.1.4** The shower should be operated by gravity flow of water and hence is not considered ideal for cleaning of eyes.

**4.1.5** The overhead shower dome should preferably be provided with means to introduce even peripheral dispersion of water in a cone to cover a large area while ensuring the deluge action.

**4.1.6** Water to the shower and washing facility shall be clean and of potable quality. In addition to the filter elements suggested in the eyewash heads, suitable capacity filter should be installed in the main inlet line to the washing facility. Such filters shall be regularly checked and renewed at least once a month.

**4.1.7** The eyewash fountains and showers shall be made from corrosion-resistant materials. This aspect shall be looked into to ensure proper maintenance and repairs. The encased components shall be made from such materials as would not lead to internal corrosion and choking of the pipeline and fittings.

**4.1.8** A multiple spray shower may be provided with 15 - 20 spray nozzles suitably located to direct flow of water from head to foot from all sides. The spray nozzles shall be designed for two rates of flow at 196 kPa ( 2 kgf/cm<sup>2</sup> ) waterhead, namely 5 and 15 min. The spray nozzles shall be so designed as to deliver a spray of rinse water without harsh jets or misting. The water cone shall have vortex angle of 45°.

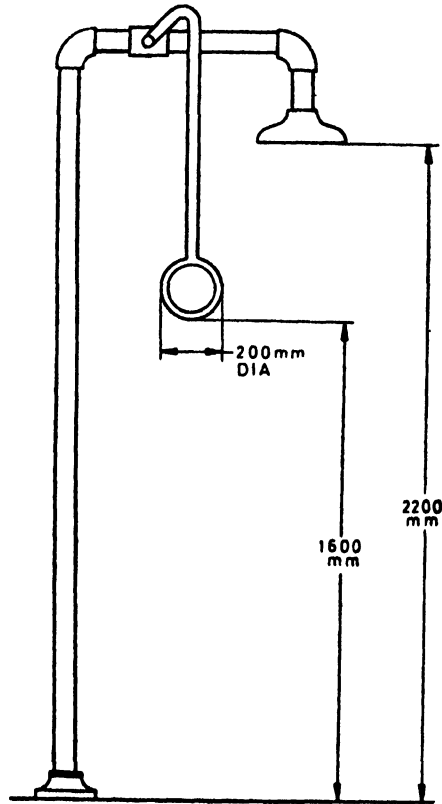


FIG. 1 EMERGENCY SAFETY SHOWER

## 4.2 Performance

**4.2.1 Shower Head** — Emergency shower head shall be so designed that a water column is provided that is not less than 210 cm, not more than 240 cm in height from the standing level. The water column shall have a minimum spray pattern diameter of 50 cm at 150 cm height from the standing level, and the centre of the spray pattern shall be located at least 40 cm from any obstruction or emergency shower head shall be designed so that it produces a straight water column. Emergency shower head shall be capable of delivering a minimum of 110 l/min of water, which shall be substantially dispersed throughout the pattern.

**4.2.2 Control Valves** — The valves shall be designed in such a manner that the water flow remains on without requiring the use of the operator's

hands. The valve shall be capable of remaining activated until intentionally shut off. The valve shall be simple to operate and go from 'off' to 'on' in 1 second or less. The valve shall be corrosion-resistant to potable water.

**4.2.3 Valve Actuator** — Stay-open or self-closing actuators shall be easily located and readily accessible to the user.

**4.3 Installation Procedure** — The unit shall be connected to a potable water supply capable of delivering not less than 110 l/min by the method shown in the manufacturer's instructions.

#### **4.4 Testing**

**4.4.1** Connect a flow meter to the shower to be tested, or provide other means of measuring water flow.

**4.4.2** Attach the shower to a 25 mm nominal bore pipe having minimum water supply. The shower head height shall be 210 cm from the standing level. The water supply shall have a control valve or pump system that may be adjusted.

**4.4.3** Open the valve on the emergency shower.

**4.4.4** Adjust the control valve on the water supply to deliver a minimum of 110 l/min and ensure that water is substantially dispersed throughout the pattern. Measure the diameter of the water pattern 150 cm from the standing level. Visually record the diameter of the spread.

#### **4.5 Maintenance and Training**

**4.5.1** Showers and spray nozzles shall be checked at least once a week to ensure proper functioning. They shall be activated daily to flush the line and to verify proper operation.

**4.5.2** Individuals shall be instructed in the proper use of emergency showers.

### **5. EYEWASH FOUNTAINS**

#### **5.1 Basic Design**

**5.1.1** Eyewash fountains ( see Fig. 2 and 3 ) are usually provided with a pair of eyewash heads and a receptacle for collection and drainage of spilled water. It shall be capable of operation by either a self-closing or a stay-open valve. The advantages of a stay-open valve are that the water flow is uninterrupted and the injured person is free to use both the hands to have better irrigation of the eyes.

**5.1.2** Each eyewash head shall be provided with a built-in particulate filter as well as suitably designed atomiser or without such arrangement, for ensuring soft flow and even dispersion of water.

**5.1.3** Eyewash fountains shall be connected with a source of clean and cool water supply at a pressure head of approximately 196 kPa ( 2 kgf/cm<sup>2</sup> ).

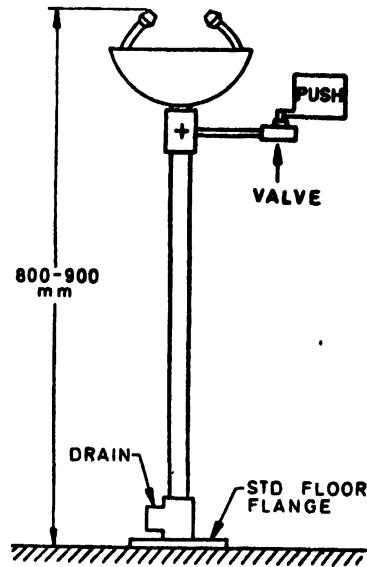


FIG. 2 EYE WASH FOUNTAIN

**5.1.4** Eyewash head shall be provided with built-in pressure and combined flow compensation so as to regulate the flow of water at the eyewash heads at approximately 16 l/min per head.

**5.1.5** Eyewash heads shall be so designed or oriented as to give a combined flow of water covering both the eyes. The centre to centre distance between the eyewash heads should be 140 to 200 mm approximately.

## 5.2 Performance

### 5.2.1 Eyewash Fountain

**5.2.1.1** A means shall be provided to assure that a controlled flow of potable water or its equivalent is provided to both eyes simultaneously at a low enough velocity so as not to be injurious to the user.

**5.2.1.2** There shall be no sharp projections anywhere in the operating area of the unit.

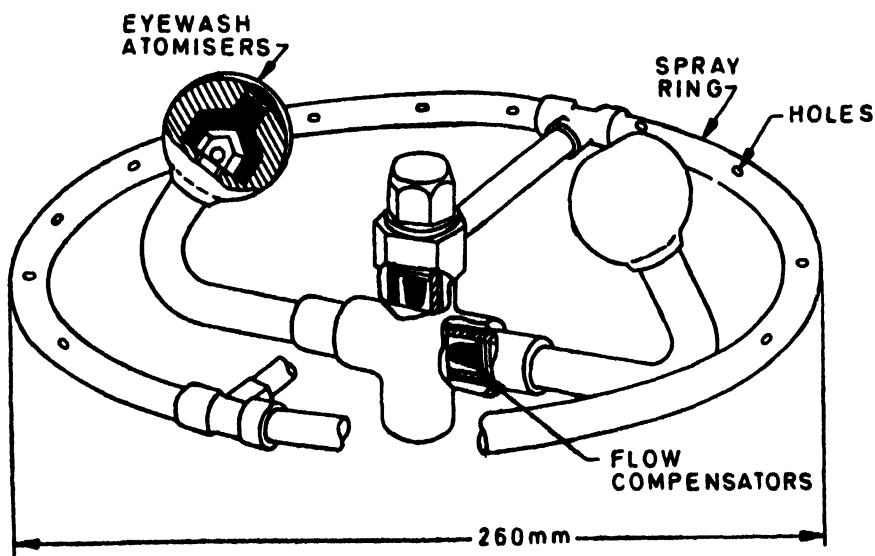


FIG. 3 FACE/EYEWASH FOUNTAIN

**5.2.1.3** Nozzles shall be protected from airborne contaminants. Whatever method is used to afford such protection, the removal shall not require a separate motion by the operator when activating the unit.

**5.2.1.4** Eyewash equipment shall be capable of delivering to the eyes not less than 1.5 l/min for a period of 15 minutes.

**5.2.1.5** The unit shall be designed in such a way as to provide enough room to allow the eyelids to be held open while the eyes are in the water stream.

**5.2.2 Control Valves** — The valve shall be designed in such a manner that the water flow remains on without requiring the use of the operator's hands. The valve shall be capable of remaining activated until intentionally shut off. The valve shall be simple to operate and go from 'off' to 'on' in 1 second or less. The valve shall be corrosion resistant to potable water. The valve actuator shall be large enough to be easily located and operated by the user.

**5.3 Installation Procedures** — Upon installation, operate valve and determine that both eyes are washed simultaneously at a low enough velocity so as not to be injurious to the user.

## **5.4 Testing**

**5.4.1** Connect a flow-meter to eyewash to be tested, or provide other means of measuring water flow.

**5.4.2** Attach the plumbed unit to a water supply line at 1 96 kPa ( 2kgf/cm<sup>2</sup> ) flow pressure.

**5.4.3** Open the valve on the eyewash unit. Verify that it opens in one second and stays open.

**5.4.4** Using the flow meter or other means, determine that the rate of flow is at least 1.5 l/min and that the flushing streams wash both eyes simultaneously at a low enough velocity so as not to be injurious to the user.

## **5.5 Maintenance and Training**

**5.5.1** Self-contained units shall be inspected for the free flow of water and checked for unobstructed passages. Correct functioning of the pressure-compensating devices shall be checked periodically.

**5.5.2** Individuals shall be trained in the proper use of emergency eyewash units.

## **6. EYE/FACE FOUNTAIN**

### **6.1 Basic Design**

**6.1.1** Face wash fountains basically differ from an eyewash fountain ( *see* Fig. 3 ) in that the water flow is arranged to cover the entire area of the face. It is usually designed in the form of a ring with 16 or more holes drilled at 15° towards the centre of the nozzle/nozzle assembly in the vertical plane, to deliver a steady soft water flow or in a pair of heads ( *see* Fig. 1 ). This spraying may be combined with eyewash fountain to give the combination device.

**6.1.2** For the combination unit the inlet water pressure shall be a minimum of 2.94 kPa ( 3 kgf/cm<sup>2</sup> ) if considered essential.

**6.1.3** Both the components should be provided with flow/pressure compensators so as to deliver a soft water flow of a minimum of 16 l/min from each head of the eyewash and 25 l/min from the spray.

**6.1.4** The spraying shall have a diameter of 200 to 300 mm.

**6.1.5** Face/eyewash fountains can also be designed without spraying provided the larger capacity twin heads give full eye and face coverage.



**6.1.6** These spray units can be actuated by a self-closing or stay-open valve. Stay-open valve is preferable as it enables the victim to use both the hands for better washing.

## **6.2 Performance**

### **6.2.1 Eye/Face Fountain**

**6.2.1.1** A means shall be provided to ensure that a controlled flow of potable water or its equivalent is provided to both eyes simultaneously at a low enough velocity so as not to be injurious to the user, and to wash the face simultaneously.

**6.2.1.2** There shall be no sharp projections anywhere in the operating area of the unit.

**6.2.1.3** Nozzles shall be protected from airborne contaminants. Whatever method is used to afford such protection, the removal shall not require a separate motion by the operator when activating the unit.

**6.2.1.4** Emergency eye/face wash equipment shall be capable of delivering to the eyes and face not less than 10 l/min for a period of 15 minutes. The unit shall be designed in such a way as to provide enough room to allow the eyelids to be held open while the eyes are in the water stream.

**6.2.2 Control Valves** -- The valve shall be designed in such a manner that the water flow remains 'on' without requiring the use of the operator's hands. The valve shall be capable of remaining activated until intentionally shut off. The valve shall be simple to operate and go from 'of' to 'on' in 1 second or less. The valve shall be corrosion-resistant to potable water. The valve actuator shall be large enough to be easily located and operated by the user.

## **6.3 Testing**

**6.3.1** Connect a flow-meter to eyewash to be tested or provide other means of measuring water flow.

**6.3.2** Attach the plumbed unit to a 1.3-cm supply line of water 196 kPa (2 kgf/cm<sup>2</sup>) flow pressure.

**6.3.3** Open the valve on the eyewash unit, verify that it opens in 1 second and stays open.

**6.3.4** Using the flow meter or other means, determine that the rate of flow is at least 10 l/min and the flushing streams rise to approximate equal heights and the water washes the eyes and face at a velocity low enough so as not to be injurious.

#### 6.4 Maintenance and Training

**6.4.1** Eye/face wash units shall be activated weekly to flush the line and to verify proper operation.

**6.4.2** Individuals shall be trained in the proper use of emergency eye/face wash units.

#### 7. COMBINATION SHOWER AND EYEWASH OR EYE/FACE FOUNTAIN

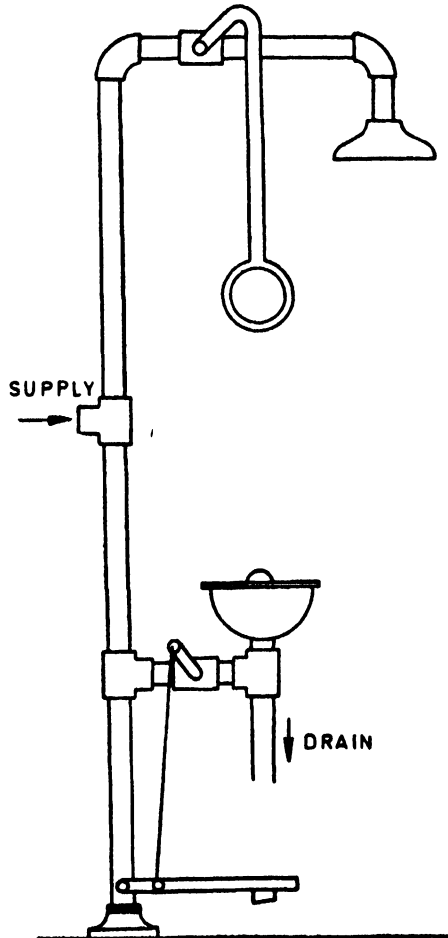


FIG. 4 COMBINATION OF SHOWER AND EYEWASH

**7.1 Performance Requirements for Combination Units** — Combination units ( *see* Fig. 4 ) shall be designed so that all components can be operated individually from a common fixture supply line. Showers shall meet performance requirements of 4. Eyewash units shall meet performance requirements of 5. Eye/face wash units shall meet performance requirements of 6.

## **8. MARKING AND PACKING**

**8.1 Marking** — Each emergency showers, eye and face fountains and combination units shall be marked with manufacturer's name or recognized trade-mark if any, designation and any other mark of identification desired by the purchaser.

**8.1.1** The product may also be marked with Standard Mark.

**8.1.2** The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufactures or producers may be obtained from the Bureau of Indian Standards.

**8.2 Packing** — Each emergency showers, eye and face fountains and combination units shall be packed as agreed to between the purchaser and the supplier.

( Continued from page 2 )

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### **Regional Offices:**

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

2323 7617

\*Eastern : 1/14 CIT Scheme VII M, V.I.P. Road, Kankurgachi, KOLKATA 700054

2337 8662

Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022

260 9285

Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113

2254 1984

†Western: Manakalaya, E9, MIDC, Behind Marol Telephone Exchange, Andheri (East), MUMBAI 400093

2832 9295

### **Branch Offices:**

'Pushpak', Nurmohamed Shaikh Marg, Khanpur, AHMEDABAD 380001

560 1348

Peenya Industrial Area, 1<sup>st</sup> Stage, Bangalore-Tumkur Road, BANGALORE

839 4955

Commercial-cum-Office Complex, Opp. Dushera Maidan, Arera Colony, Bittan Market, BHOPAL 462016

242 3452

62-63, Ganga Nagar, Unit VI, BHUBANESHWAR 751001

240 3139

5<sup>th</sup> Floor, Kovai Towers, 44 Bala Sundaram Road, COIMBATORE 641018

221 0141

SCO 21, Sector 12, Faridabad 121007

229 2175

Savitri Complex, 116 G.T. Road, GHAZIABAD 201001

286 1498

53/5 Ward No. 29, R.G. Barua Road, 5th By-lane, Apurba Sinha Path, GUWAHATI 781003

245 6508

5-8-56C, L.N. Gupta Marg, Nampally Station Road, HYDERABAD 500001

2320 1084

Prithavi Raj Road, Opposite Bharat Overseas Bank, C-Scheme, JAIPUR 302001

222 3282

11/418 B, Sarvodaya Nagar, KANPUR 208005

223 3012

Sethi Bhawan, 2<sup>nd</sup> Floor, Behind Leela Cinema, Naval Kishore Road, LUCKNOW 226001

261 8923

H. No. 15, Sector-3, PARWANOO, Distt. Solan (H.P.) 173220

235 436

Plot No A-20-21, Institutional Area, Sector 62, Goutam Budh Nagar, NOIDA 201307

240 2206

Patliputra Industrial Estate, PATNA 800013

226 2808

Plot Nos. 657-660, Market Yard, Gultkdi, PUNE 411037

2427 4804

"Sahajanand House" 3<sup>rd</sup> Floor, Bhaktinagar Circle, 80 Feet Road, RAJKOT 360002

237 8251

T.C. No. 2/275 (1 & 2), Near Food Corporation of India, Kesavadasapuram-Ulloor Road, Kesavadasapuram, THIRUVANANTHAPURAM 695004

255 7914

1<sup>st</sup> Floor, Udyog Bhavan, VUDA, Siripuram Junction, VISHAKHAPATNAM-03

271 2833

\*Sales Office is at 5 Chowringhee Approach, P.O. Princep Street, KOLKATA 700072

2355 3243

†Sales Office (WRO) Plot No. E-9, MIDC, Rd No. 8, Behind Telephone Exchange, Andheri (East), Mumbai-400 0093

2832 9295